

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* LENNY LOW and RANDY PON

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Appeal 2007-2408  
Application 09/822,073  
Technology Center 3700

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Decided: November 21, 2007

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Before MURRIEL E. CRAWORD, HUBERT C. LORIN, and LINDA E.  
HORNER, *Administrative Patent Judges*.

HORNER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Lenny Low and Randy Pon (Appellants) seek our review under 35 U.S.C. § 134 of the final rejection of claims 1-6. We have jurisdiction under 35 U.S.C. § 6(b) (2002).

## SUMMARY OF DECISION

We REVERSE.

## THE INVENTION

The Appellants' claimed invention is to a method and apparatus employed on a spacecraft for transferring heat from a remote heat source to a thermal radiator using a loop heat pipe. Claim 1, reproduced below, is representative of the subject matter on appeal.

1. A heat transfer system comprising:
  - a spacecraft comprising a heat dissipating system;
  - a remotely-located heat source disposed on the spacecraft at a location that is remote from the heat dissipating system and which is not located on a heat pipe panel; and
  - a loop heat pipe thermally coupled between the remotely-located heat source and the heat dissipating system for coupling heat generated by the heat source to the heat dissipating system.

## THE REJECTIONS

The Examiner relies upon the following evidence:

Esposito	US 5,743,325	Apr. 28, 1998
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The following rejections are before us for review:

1. Claims 1-6 are rejected under 35 U.S.C. § 112, first paragraph as containing subject matter which was not described in the specification in such a way as

to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

2. Claims 1-6 are rejected under 35 U.S.C. § 102(b) as anticipated by Esposto.

### ISSUES

The first issue before us is whether the Appellants have shown that the Examiner erred in holding claims 1-6 unpatentable under 35 U.S.C. § 112, first paragraph. This issue turns on whether the Appellants' Specification contains sufficient written descriptive support for "a remotely-located heat source disposed ... at a location that is remote from the heat dissipating system...; and a loop heat pipe thermally coupled between the ... heat source and the heat dissipating system."

The second issue before us is whether the Appellants have shown that the Examiner erred in rejecting claims 1-6 under 35 U.S.C. § 102(b) as anticipated by Esposto. This issue turns on whether Esposto discloses a remotely-located heat source and a loop heat pipe thermally coupled between the heat source and a heat dissipating system.

### FINDINGS OF FACT

We find that the following enumerated findings are supported by at least a preponderance of the evidence. *Ethicon, Inc. v. Quigg*, 849 F.2d 1422, 1427 (Fed. Cir. 1988) (explaining the general evidentiary standard for proceedings before the Office).

1. The Specification appears to distinguish heat pipe panels from radiator panels. For example, the Specification states, “although there are other heat sources that are located remotely from either of the radiator panels 12, 13, or from heat dissipating apparatus such as heat pipe panels, ....” (Specification 3:2-4). The Specification also describes, “[m]ore particularly, the heat transfer system is used with a heat dissipation component or heat source not located on a heat pipe panel or mounted on a thermal radiator” (Specification 2:5-7).
2. The Specification states, “[t]he loop heat pipe is a two phase heat transfer device which has a discrete evaporator (where heat goes into the device) and a discrete condenser (where heat is rejected by the device). The loop heat pipe uses thin walled tubing to connect the evaporator and condenser.” (Specification 2:9-12.) It appears from this description that the loop heat pipe includes an evaporator, a condenser, and thin walled tubing connecting the two.
3. The only remaining components described in the Specification that perform a heat dissipating function, and thus constitute the heat dissipating system, are radiator panels, heat pipe panels, RF loads, output multiplexer (OMUX) filters, RF switches and circulators (Specification 3:2-5).
4. The Specification, as originally filed, describes the heat source located remotely from a heat dissipating system (*see e.g.*, Specification 2:1-2, 3:2-5, 4:6-7, Figure 3 (element 31), original claims 1, 3, and 5).

5. The Specification, as originally filed, also describes a heat source located remotely from a heat pipe panel (Specification 3:2-4).
6. One skilled in the relevant art would have understood from the Specification, as originally filed, that the loop heat pipe and the heat dissipating system are different components (see e.g., Specification 4:7-8). Further, the claims as originally filed recite “a loop heat pipe thermally coupled between the heat source and the heat dissipating apparatus,” and the flowchart of Figure 3, as originally filed, discloses thermally coupling a loop heat pipe between the heat source and the heat dissipating system (Fig. 3, element 32).
7. Esposto discloses a payload structure 8 having two fixed radiator panels 14 and 16 on either side of the structure and employing heat pipes 18 to carry thermal energy from the equipment modules (heat sources), disposed in interior space 22, to the radiators (Esposto, col. 3, ll. 58-64 and col. 4, ll. 20-21).
8. Esposto further discloses two deployable radiators 10 and 12 that are hingedly connected to the fixed radiator panels 14 and 16, respectively (Esposto, col. 4, ll. 16-18 and Fig. 1).
9. Serpentine sections 20 of Esposto’s heat pipes 18 are fastened on one end to the fixed radiator panels 14 and 16, and on the other end to the deployable radiator panels 10 and 12 (Esposto, col. 4, ll. 11-14; Fig. 1).
10. As such, Esposto’s heat dissipating system includes radiator panels 10, 12, 14, and 16.

11. Esposto's heat source, located in interior space 22 of payload structure 8, is not located "remotely" from Esposto's heat dissipating system. Rather, the heat source is directly adjacent to the radiator panels 14 and 16 (Esposto, Fig. 1).
12. Further, Esposto's serpentine sections 20 are located between the fixed radiator panels 14 and 16 and the deployable radiator panels 10 and 12 of Esposto's heat dissipating system and are not thermally coupled between Esposto's heat source and its heat dissipating system (Esposto, Fig. 1).

#### PRINCIPLES OF LAW

"The function of the description requirement [of the first paragraph of 35 U.S.C. § 112] is to ensure that the inventor had possession, as of the filing date of the application relied on, of the specific subject matter later claimed by him." *In re Wertheim*, 541 F.2d 257, 262 (CCPA 1976) (citations omitted). "It is not necessary that the claimed subject matter be described identically, but the disclosure originally filed must convey to those skilled in the art that applicant had invented the subject matter later claimed." *In re Wilder*, 736 F.2d 1516, 1520 (Fed. Cir. 1984) (citing *In re Kaslow*, 707 F.2d 1366, 1375 (Fed. Cir. 1983)).

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987).

## ANALYSIS

### *Rejection of claims 1-6 under 35 U.S.C. § 112, first paragraph*

The Appellants argue claims 1-6 as a group (Appeal Br. 4). As such, we select claim 1 as the representative claim, and claims 2-6 stand or fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2007).

The language of claim 1 at issue in this rejection is “a remotely-located heat source disposed on the spacecraft at a location that is remote from the heat dissipating system and which is not located on a heat pipe panel” and “a loop heat pipe thermally coupled between the remotely-located heat source and the heat dissipating system for coupling heat generated by the heat source to the heat dissipating system.”

We found the language of claim 1 particularly difficult to interpret due to the inconsistent use of terminology in the Specification as compared to the claims, and the imprecision in the claim terminology. For example, the claim refers to a “heat pipe panel.” The Appellants contend that the claimed “heat pipe panel” is the same as the radiator panels 12 and 13 discussed in the Specification (Appeal Br. 5). However, the Specification appears to distinguish heat pipe panels from radiator panels (Finding of Fact 1).

In another example, the Specification never clearly indicates which of the components comprise the claimed “heat dissipating system.” The Specification describes that the loop heat pipe includes an evaporator, a condenser, and thin walled tubing connecting the two (Finding of Fact 2). If the heat dissipating system is distinct from the loop heat pipe, as claimed, then the only remaining

components described in the Specification that perform a heat dissipating function are radiator panels, heat pipe panels, RF loads, output multiplexer (OMUX) filters, RF switches and circulators (Finding of Fact 3). The language of claim 1, however, appears to distinguish the “heat pipe panel” and the “heat dissipating system.” In particular, claim 1 recites that the heat source is “remote from the heat dissipating system” and “is not located on a heat pipe panel.” If the heat pipe panel were part of the heat dissipating system, then this additional limitation, reciting that the heat source is not located on a heat pipe panel, would be redundant.

While we agree with the Appellants that claims and Specification, as originally filed, provide written descriptive support for a heat source remote from a “heat dissipating apparatus” (Finding of Fact 4), the language now used in claim 1 differs from the original claims. Specifically, the claims as originally filed did not contain the additional limitation that the heat source is not located on a heat pipe panel. As such, one skilled in the relevant art may have construed the “heat dissipating apparatus” of the original claims to include a heat pipe panel. However, with the amendment to claim 1 that appears to distinguish a heat pipe panel from the claimed “heat dissipating system,” the claim is now less clear than before.

With these issues in mind, we have interpreted the language of claim 1 so that we can determine whether adequate written descriptive support exists for the claimed invention. With regard to the limitation of “a remotely-located heat source disposed on the spacecraft at a location that is remote from the heat dissipating system and which is not located on a heat pipe panel,” we find that the claims,



Figures, and Specification, as originally filed, contained sufficient written description to show that the inventor had possession, as of the filing date, for this claim limitation (Findings of Fact 4, 5).

With regard to the limitation of “a loop heat pipe thermally coupled between the remotely-located heat source and the heat dissipating system for coupling heat generated by the heat source to the heat dissipating system,” the Examiner found that “[t]he system ‘10’ as stated in applicant’s originally filed specification on page 3, line 6 comprises a loop heat pipe.” The Examiner thus concluded that the originally filed Specification states that the loop heat pipe and the heat dissipating system are one in the same and so the claim recitation that the loop heat pipe is thermally coupled between the heat source and the heat dissipating system cannot be physically possible (Answer 3-4). We disagree.

While the Specification, as originally filed, may have been inconsistent in its description of the components of the invention and may have used imprecise and/or incorrect numbering of its elements in the figures, we find that one skilled in the relevant art would have understood, based on the Specification, claims, and figures, as originally filed, that the loop heat pipe and the heat dissipating system are different components (Finding of Fact 6). As such, we find sufficient written descriptive support in the Specification, claims, and figures, as originally filed, to show that the inventor had possession, as of the filing date, for this claim limitation. Accordingly, we do not sustain the Examiner’s rejection of claims 1-6 under 35 U.S.C. § 112, first paragraph.<sup>1</sup>

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<sup>1</sup> We further note a typographical error in the claim dependency of claim 4. Claim 4 refers to “[t]he spacecraft recited in Claim 2.” Claim 2, however, is directed to a

*Rejection of claims 1-6 under 35 U.S.C. § 102(b) as anticipated by Esposto*

Claim 1 recites “a remotely-located heat source disposed on the spacecraft at a location that is remote from the heat dissipating system and which is not located on a heat pipe panel” and a “loop heat pipe thermally coupled between the remotely-located heat source and the heat dissipating system.” Independent claims 3 and 5 contain similar limitations.

The Examiner found that Esposto’s heat source, located inside interior space 22, is remote from its heat dissipating system (i.e., radiator panels 10 and 12) and that its loop heat pipe 20 is thermally coupled between the heat source and the heat dissipating system (Answer 3, 4). The Examiner erred in the reading of Esposto.

Esposto’s heat dissipating system includes radiator panels 10, 12, 14, and 16 (Findings of Fact 7-10). It is clear from Figure 1 of Esposto, that its heat source, located in interior space 22 of payload structure 8, is not located “remotely” from Esposto’s heat dissipating system. Rather, the heat source is directly adjacent to the radiator panels 14 and 16 (Finding of Fact 11). Further, Esposto’s serpentine sections 20 are located between the fixed radiator panels 14 and 16 and the deployable radiator panels 10 and 12 of Esposto’s heat dissipating system and are not thermally coupled between Esposto’s heat source and its heat dissipating system, as claimed (Finding of Fact 12). Accordingly, Esposto does not anticipate the claimed invention, and thus we do not sustain the Examiner’s rejections of independent claims 1, 3, and 5, or claims 2, 4, and 6 which depend therefrom, as anticipated by Esposto.

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heat transfer system. It appears that claim 4 should be corrected to depend from claim 3.

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### CONCLUSIONS OF LAW

We conclude the Appellants have shown that the Examiner erred in rejecting claims 1-6 under 35 U.S.C. § 112, first paragraph, and under 35 U.S.C. § 102(b).

### DECISION

The decision of the Examiner to reject claims 1-6 is reversed.

REVERSED

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